



# Presentation to 15<sup>th</sup> Night Operations Symposium October 10, 2000



Dr. F.L. Fernandez

Director, Defense Advanced Research Projects Agency

### **DARPA Mission**



### Technical Innovation in Support of National

### Security

- Solve National-level problems
- Enable Operational Dominance
- High-Risk, High-Payoff Technology Development and Exploitation

### **DARPA Organization**



Director Frank Fernandez Deputy Director Jane Alexander

#### Advanced Technology

Tom Meyer <del>William Jeffrey</del>

Early Entry, Rapid Reaction Forces, Special Forces

Communications

**Military Assistant** 

**Maritime** 

#### Defense Sciences

Michael Goldblatt
Steven Wax

Bio Warfare Defense Technologies

Biology Materials &

#### Information Systems

William Mularie Kathy MacDonald

Information Assurance & Security

Command & Control

### **Information Technology**

Shankar Sastry

Mark Swinson

Networking Embedded and Autonomous Computing

User Interfaces & Translation

#### MicrosystemsTech nology

Robert Leheny Ellison Urban

Electronics Optoelectronics MEMS Combined

**Microsystems** 

#### **Special Projects**

James Carlini Amy Alving

Biological Warfare Defense Systems

Surface/Undergrou nd Target Engagement

Sensor/Navigation

#### Tactical Technology

David Whelan Allen Adler

Air, Space, & Land Platforms

**Laser Systems** 

**Future Combat Systems** 

**Operational Liaisons** 

Software of R. Kurjanowicz, USAF Col R. Kurjanowicz, USAF; LTC G. Sauer, U\$A 6/00

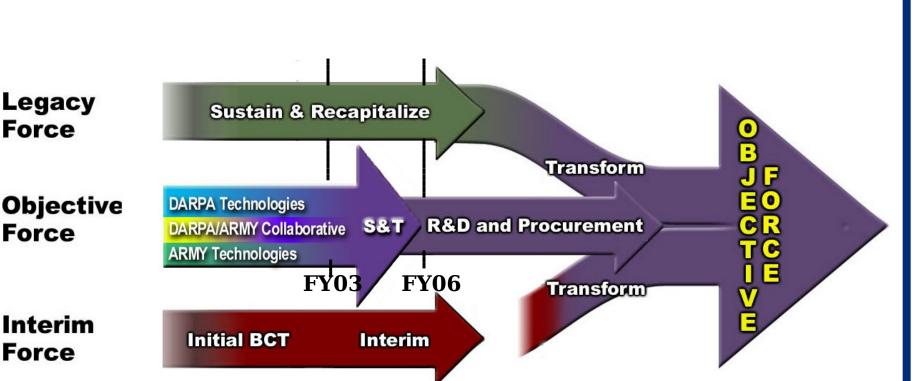


Force

Force

Force

### The Army Transformation



. . . Responsive, Deployable, Agile, Versatile, Lethal, Survivable, Sustainable.

# What is the FCS Program PARPA

- A collaborative program between DARPA and the US Army to evaluate and competitively demonstrate Future Combat Systems
- The FCS Program will:
  - Define and validate FCS design/operational concepts using modeling and simulation and surrogate exercises
  - Develop key enabling technologies for distributed lighter forces
  - Fabricate and test a multi-mission FCS
     Demonstrator to facilitate EMD and production

Simultaneously conduct a system/concept definition and design addressing the enabling technologies, allowing a critical decision in FY 03 and the creation of a systems demonstrator by FY 06

# Why DARPA?



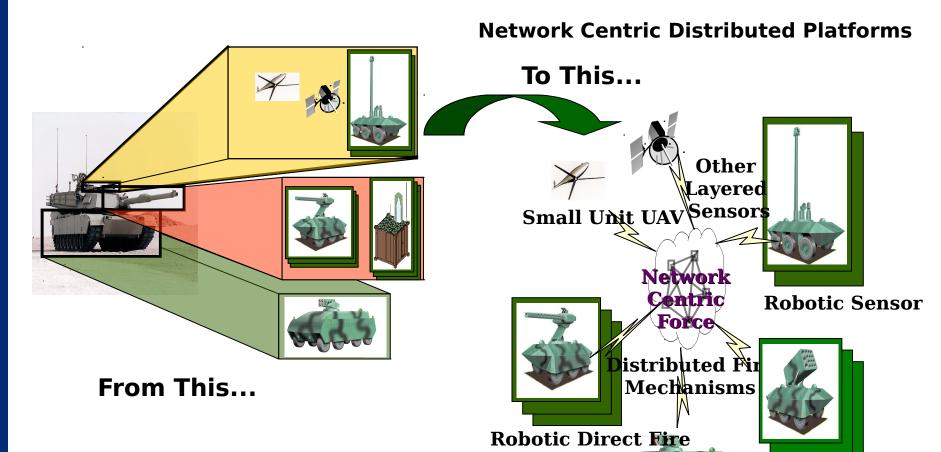
- DARPA's role in DoD is to be the technical enabler for innovation for national security
- DARPA serves as a temporary independent agent to catalyze radical innovation for the Army
- FCS must go back to the Army for full development

### The Challenge



- What makes the DARPA/Army Collaborative Demonstration Program so challenging?
  - Short-term, parallel development of system-of- systems concepts and key technology efforts
  - New operating concepts are being developed concurrently
  - System concept incorporates network warfare and relies heavily on robotics

# Baseline System Concept PARPA



Exploit Battlefield Non-Linearities using Technology to Reduce the Size of Platforms and the Force

**Robotic NLOS Fire** 

ned C2/Infantry Squad

## **Major Technology**



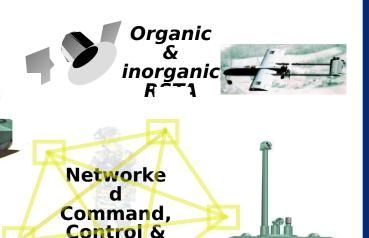
### Challenges

- Maneuver BLOS
  - Networked Fires
- Organic All-Weather Targeting Vehicles & Sensors
- Networked
   Command Control Service
   Community

Commu Advanced Sensors are Key to the FCS Net-Centric Approach

**Direct** 

Fire Function \*





Comms



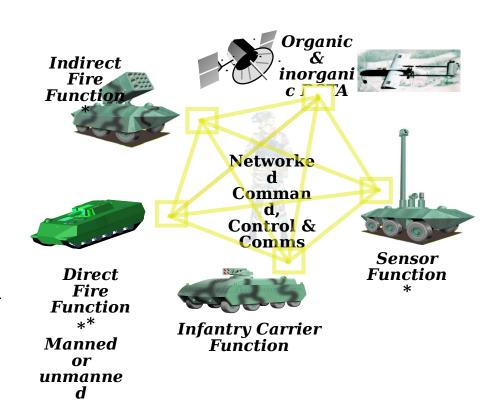
\* Manned or nmanned

Sensor

Function\*

# What Makes FCS Different DARPA

- Network centric
  - Know precisely, in realtime, location of all friendly and enemy forces
- Robotics integrated into force
  - Amplify capability of manned elements
  - Multi-functional (RSTA, armed, sustainment)
- Increased reliance on extended range engagement
  - Organic plus strategic and tactical support
  - Long range ISR and precision fires
- Capable of air-mobile operations
  - Commercial and minimum DoD strategic and tactical lift



### FCS Management



- LTC Marion Van Fosson, USA, DARPA/TTO, is Program Manager for system-of-systems work
- Dr. Allen Adler, DARPA/TTO, is Chief Scientist for Enabling Technologies
- Individual DARPA Program Managers are managing Enabling Technologies work
- Total program dollars:
  - Through FY 03: \$614.2M
  - FY 04 FY 05: \$302.0M

### FCS Enabling Technologies Programs



- FCS Communications (J. Freebersyser)
- Unmanned Ground Combat Vehicle (S. Fish)
- Perception for Autonomous Navigation (S. Fish)
- A160 (A. Morrish)
  - High-altitude, long-endurance airborne sensor platform
  - Sensor: ~250 lbs. payload; all-weather capable; probably RF
- Organic Air Vehicle Micro Air Vehicle (S. Wilson)
  - Organic, airborne sensor platform, <100 lbs total vehicle weight</li>
  - Sensor: EO/IR or LADAR; affordability is key
- FCS Command and Control (G. Sauer)
- LADAR Sensing for Combat ID (R. Hummel)
- Netfires (B. Tousley)

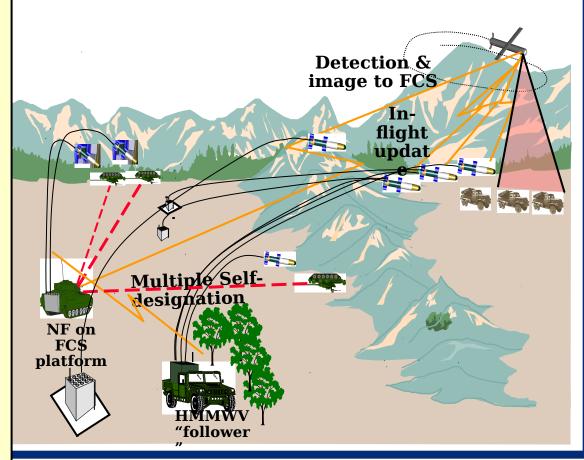
# Demonstrate two LOS/NLOS PTIPES



### weapons

- Rapid Response PAM
  - Short time of flight (100s/25km)
  - Multimode terminal quidance
  - Low cost configuration: **Uncooled imaging IR** seeker
  - Lock-on after launch
- •Hunter Killer LAM
  - 3-D ladar seeker w/ATR, **TERCOM**
  - Significant loiter
  - Multi-mission including BDA
- •PAM/LAM
  - GPS/INS guidance
  - Variable propulsion
  - Terminal guidance (end game)
  - Midcourse update through networked 2way data link
- Platform independent launcher

"This fundamentally reengineers close combat."



### **Conclusion**



- FCS Enabling Technologies programs are underway
- Advanced sensors are key to the FCS network-centric approach
- FCS next step: Experimentation and Operational Concept Development